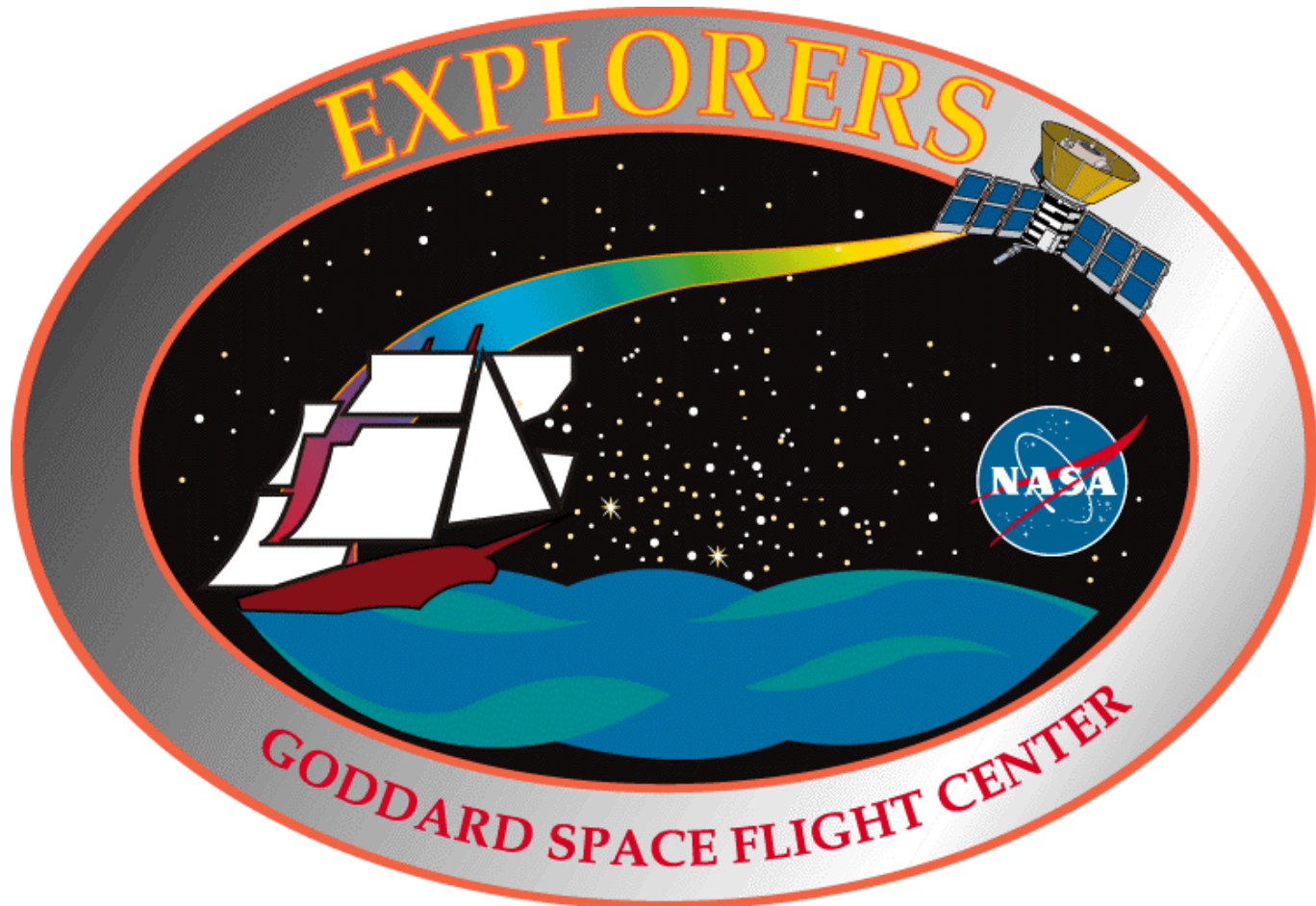
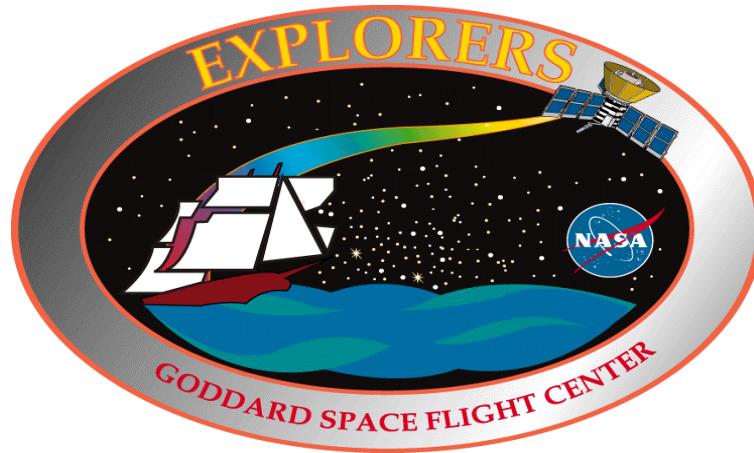


SMEX Kickoff Meeting Safety, Reliability, & Quality Assurance Handout



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Marriott



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SMEX Kickoff Meeting SR&QA Handout

- **SR&QA effort is controlled by SMEX AO, EPL Reference Document #36.**
 - **Page 2, Par. 1.1 discusses EXP Program Office & PI joint effort to define best mix of roles and responsibilities for SR&QA execution.**
 - **Mission Definition & Requirements Agreement. (EPL Ref. #45)**
 - **Code 410/PI SR&QA Insight Agreement.**
 - **Becomes part of GSFC/PI Contract as a condition for confirmation.**
 - **Defines Early the Inter-Institutional Partnering Arrangement for SR&QA services.**
 - **Page 3, Par. 2.1 requires PIs to implement a product assurance program that is consistent with ISO 9000 series ANSI/ASQC Q9001-2000.**
 - **ISO registration not required, but compliance is expected with the Standard's sections where it makes good engineering and programmatic sense.**
 - **Program must meet SMEX Safety, Reliability, and Quality Assurance Requirements, as published with the AO.**
 - **Tailoring encouraged in most assurance technology areas, but ...**

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- The highly specialized discipline of System Safety, including the Range Safety effort, is dictated by statute. Therefore, expert guidance through the process is available from GSFC by PI teams. It is crucial that PI's allocate resources early for this effort.
 - Requires hazards analysis
 - Systems Safety Plan
 - MSPSP
 - Magnitude of System Safety effort must not be under-estimated.
 - Allocate/identify roles & resources.
- Details of specific System Safety program requirements and deliverables with process flow descriptions (EPL Ref. #36 a-d).
- Orbital Debris Analysis required early.

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- **The SMEX SR&QA Requirements document addresses Missions of Opportunity.**
 - **Permits further tailoring for Missions of Opportunity.**
 - **Balloon requirements in SR&QA document (EPL Ref. #36).**
- **Specifics of PI SR&QA Program to be negotiated with Explorers during definition phase.**
 - **SMEX SR&QA Requirements are basis for PI SR&QA Program & associated documentation.**
 - **A specific Project Mission Assurance Requirements document will be generated by the GSFC Explorers Program Office from the base SR&QA document after selection.**
 - **PI program shall be modeled after ANSI/ASQC Q9001-2000.**
 - **Quality Manual or equivalent document to be reviewed by GSFC for comments during Phase B.**

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- **SMEX SR&QA document Highlights:**
 - **Invokes NASA Hi-Reliability Workmanship standards.**
 - **New NASA adoption of ANSI/ESD S20.20**
 - **NASA-Std-8739.7 canceled on ESD**
 - **Strongly Urges flight Printed Wiring Board Coupon DPA prior to population with flight EEE parts.**
 - **Requires a PI Failure Reporting System for phase C/D/E.**
 - **Design Review Requirements for IIRT and Peer reviews.**
 - **EEE Parts Selection criteria per GSFC 311-INST-002.**
 - **PI shall maintain and review Parts Lists with GSFC via a participative Parts Review Board process.**
 - **PI shall use an organized system to manage parts application, evaluation, and use.**
 - **Includes mandatory GIDEP Alert and NASA Advisory responses.**
 - **GSFC Parts Engineering available as a resource**

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- Materials and Processes program required as typical for GSFC sponsored missions.**
 - Preliminary and final materials lists
 - Interface with GSFC for new materials or unconventional uses.
 - Use of GIDEP system

- Closed loop problem/failure reporting system for HW and SW with documentation**

- Reliability**
 - Risk assessments made and mitigation strategies identified.
 - Critical evaluation of single string and fault tolerance design
 - Use of FTA, FEMA, and PRA for instruments, s/c, and Observatory

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– Software

- **Code to be structured, error free, and maintainable.**
- **Establish & document SW requirements, external interface specs, user guides.**
- **Internal (peer) and external software design reviews.**
- **Participation with NASA's IV&V Facility mandatory.**

– Verification

- **Verification/test program to ensure all mission requirements are met.**
- **Documentation to include verification matrix, environments matrix, and test procedures.**
- **“Test as you fly; Fly as you test”**

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- **Emergent Themes Directed by NASA HQ**
 - **IIR Team Reviews.**
 - **Team expectations can exceed baseline review requirements.**
 - **Reviews w/extra, detailed questions: SSR through PSR includes SW.**
 - **RFA trail & Failure Report closures thoroughly checked by the IIRT.**
 - **GSFC Policy has shifted to Code 301 and IIRT Co-chaired Reviews**
 - **Reliability Emphasis On:**
 - **Probabilistic Risk Assessment (PRA).**
 - **Fault Tree Analysis, etc.**
 - **FMEA @ subsystem level.**
 - **Identify all single string design features.**
 - **Failure Impacts/mitigation.**
 - **Tangible Continuous Risk Tracking & Management System.**
 - **Software IV&V.**
 - **Each mission evaluated for SW complexity/risk/need.**
 - **Determination of appropriate level of IV&V involvement via standardized criteria.**

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- **Web sites of Interest:**
 - **LaRC Explorers Library**
 - <http://explorer.larc.nasa.gov/explorer/sel.html>
 - **NASA Online Directives Information System Library**
 - http://nodis.gsfc.nasa.gov/library/main_lib.html
 - **NASA Lessons Learned**
 - <http://llis.nasa.gov/>
 - **NASA Guidelines and Procedures for Orbital Debris**
 - http://www.hq.nasa.gov/office/codeq/doctree/1740_14.pdf
 - **NASA Workmanship Standards**
 - <http://workmanship.nasa.gov/index.jsp>
 - **NASA Electronic Packaging and Parts**
 - <http://www.nepp.nasa.gov/>
 - **NASA SW IV&V Facility**
 - <http://www.ivv.nasa.gov/>
 - **GSFC Office of Systems Safety and Mission Assurance Home Page**
 - <http://arioch.gsfc.nasa.gov/>
 - **GSFC Risk Management**
 - <http://smo.gsfc.nasa.gov/riskman/index.html>

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**Mission Safety and Success are GSFC
Center Director's Ultimate Responsibility
to NASA Administrator.**